REMARKS

1. Specification

Corrections have been made to the substitute specification to correct the informalities you found on pages 3, 6, 14, 20, 22, 23, and 24.

On page 41 of the marked-up specification, the statement "the modification that the a-priori probability p(x(k))=p(d(k))=0 corresponding to setting the probability p(d(k)=+1)=p(d(k)=-1)=1/2" is deleted in the currently amended specification since it is incorrect and out of context.

The term "p(d(k))" has been added by amendment to what is now equation 16 on page 30, in line 2, in order to agree with the amended "DX" defined in equation 11 on page 23

$$
\begin{aligned}
DX &= \ln[p(x|y)\} \\
&= \ln[p(s|s')] \\
&= \mathrm{Re}(yx^*)/\sigma^2 - |x|^2/2\sigma^2 + \underline{p}(d) \\
&= DX(s|s')
\end{aligned}
$$

which explains the addition by amendment of the term "p(d(k))" on page 37 in lines 4 and 14.

This also explains the deletion by amendment of the term "p(d(k))" from what is now equation 7 on page 30, in lines 7 and 8, and also from the equations on page 31,

lines 8 and 12, and on page 31, lines 12 and 13, since the terms "D(s|s')" and "D(s'|s)" already include the term "p(d(k))".

The term "p(d(k))" is deleted from equation 10 on page 29, in line 29, for the same reason as recited in the previous.

2. Claim Rejections - 35 USC § 112

Claims 1-3 have been amended to particularly point out and distinctly claim the subject matter which I regard as the invention.

3. Claim Rejections - 35 USC § 112

All of your recommended corrections have been made in the amended claims 1-3 which particularly point out and distinctly claims the subject matter which is regarded as the claim.

Claims 1-3 are now correctly described as method-type claims.

In claim 1, page 1, line 10 "A means for the new turbo decoding a-posteriori probability p(s,s'|y) in equations (13) of the invention disclosure" is rewritten as "A method for performing a new turbo decoding algorithm using a-posteriori probability p(s,s'}y) in equations (13)".

In claim 1, page 1, line 15, "MAP in turbo dedcoding and which comprises" is rewritten as "MAP, comprising".

In claim 1, page 2, line 32, "compolex" is changed to "complex".

In claim 1, page 3, line 16, "equations realizes" is changed to "equations provide".

In claim 1, page 3, lines 9-22, the three clauses are changed to "whereby" clauses.

Claims 2 and 3 are amended to change "turbo" to "convolutional decoding and are now consistant with claim 1.

4. Claim Rejections - 35 USC § 112

The amendments include responses to the text of those sections of Title 35 U.S. Code included in a prior Office Action.

5. Claim Rejections - 35 USC § 112

Dabriri in Patent No. 5,615,515 discloses how the squared Euclidean distance metric

$M = (y-c)(y-c)^T$ in line 24 in page 9

for a received real signal "y" and a transmitted code word "c" in vector formats can be reduced to the simplified format

$M_c = SUM_{i=1,n}\{c_i(0,5-y_i)\}$ in line 45 in page 9

assuming the binary properties "$c_i=(c_i)^2=0,1$" for each data bit and, as described in lines 52-54 of page 9, assuming the hard decision detected "-1/+1" input signal is converted to the binary valued input signal "$y_i=0,1$" for his simplified decoding.

This result is only valid for hard decisioning decoding of a binary signal such as a 2-phase PSK (phase shift keying) using real signal processing.

Current communications use 1)higher order modulations instead of of 2-phase PSK to support higher data rates, 2)complex signal processing, 3) soft decisioning decoding, and 3)the Maximum Likelihood "ML" decisioning metric version of the squared complex Euclidian distance metric

$$ML = (y-x)(y-x)^{*T} / 2\sigma^2$$

wherein "y" is a complex received signal vector, "x" is the complex assumed signal state being tested, the exponent "$(o)^{*T}$" is the complex-conjugate transpose of the vector "(o)", and "$2\sigma^2$" is the 1-sigma noise.

It should be noted that this patent application reformulates the turbo decoding and convolutional decoding equations in terms of the "a posteriori decisioning metrix DX" and offers a potential for performance improvements. It should be noted that the "DX" and "ML" are related by equation

$$DX = ML - (yy^{*T} / 2\sigma) + \ln[p(x)]$$

equivalent to Bayes theorem "$p(x|y)=p(y|x)p(x)/p(y)$" which relates the a-posteriori probability "$p(x|y)$" used to define "DX" to the "ML" probability "$p(y|x)$" used to define "ML".

It is clear from this review that Dubriri's patent is not applicable to the current application and cannot have anticipated the "a-posteriori metric "DX" of this invention disclosure.

6. Response to Arguments

There are 2 real multiplies required to calculate "ML" and 2 real multiplies are also required for any simplifications of the "ML" using higher order modulations and complex signal processing and which means there is no apparent reason to simplify the "ML" metric, except for highly simplified applications such as Dubriri's application to $c_i=0,1$ sequence of data bits for a bi-phase signal wherein the input signal has been "hard decision detected" for each data bit to the real values "$y_i=0,1$". "Hard decisioning" is rarely used because of the performance loss and availability of electronics to calculate "soft decisioning" through implementation of the "ML" metric.

7. Comments

Thanks ever for your welcomed suggestions and guidelines. Please give me any assistance you believe is necessary.

Sincerely,

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